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SHOULD ASIAN COUNTRIES ADOPT GM CROPS DESPITE TRADE REGULATIONS?

A POLICY SIMULATION IN INDIA, BANGLADESH, INDONESIA, AND THE PHILIPPINES

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This brief summarizes a study evaluating the potential economic effects of introducing genetically modified (GM) food crops in India, Bangladesh, Indonesia, and the Philippines in the presence of trade regulations.

GM food crops and international trade: a policy dilemma

The fear of export losses has reportedly played a role in discouraging Asian countries to test and/or approve new GM food crops despite their productivity potential. Facing a tradeoff between productivity growth and export objectives, these countries are confronted with three possible alternatives: 1) to allow the production of GM food crops with the risk of losing potential exports, 2) to reject the commercialization of any GM food crop, or 3) to produce both GM and non-GM crops separately at a marketing cost. The purpose of the study summarized in this brief is to provide an economic assessment of these three possible strategies, by considering four populous and growing countries of Asia: India, Bangladesh, Indonesia, and the Philippines.

An economic simulation based on productivity assumptions formulated by local scientists

The study concentrates on major food or feed crops that are largely traded (rice, wheat, maize, and soybeans), and also includes cotton. The productivity assumptions are based on focus-group meetings held with scientists in each of the countries. For each crop, a set of biotic or abiotic stress-resistance traits is selected. The expected productivity effects of each GM crop/trait combination is then derived in each country, and associated with plausible assumptions regarding their potential adoption rates in 2015.

The authors use an economic model of international trade to simulate the effects of GM crop adoption under different scenarios. This model accounts for the specificity of the GM/non-GM commodity markets and the import policies of GM food in Europe, Australia, New-Zealand, Japan, and South Korea. In the short run, it is assumed that these countries ban all imports of the crop from the GM-adopting nation. In the medium to long run, it is assumed that the labeling policies in these countries act as trade filters, allowing GM products such as animal feed, but not finished food products that are targeted by the labeling regulations. In both cases, specific scenarios are generated, allowing pure non-GM products as exports to the sensitive countries.

Results: perceived commercial risks, productivity gains, and the role of segregation

Overall, the results show that the adoption of GM crops can be translated into significant economic gains in all the focus countries in the presence or absence of trade restrictions in sensitive countries (Table 1).

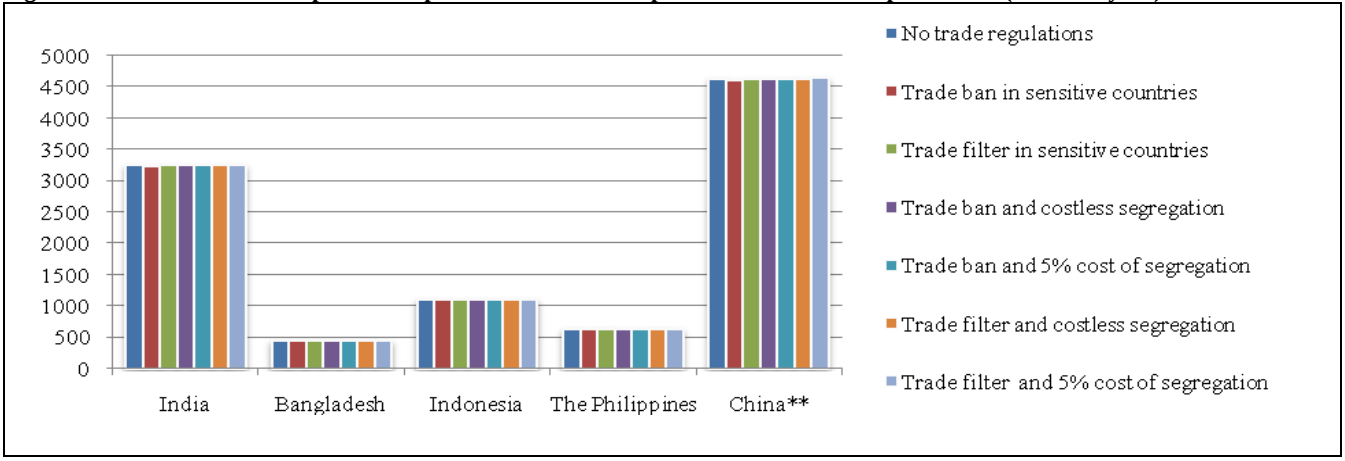
Table 1. Results: Range of total welfare gains with GM crop adoption in the four countries across scenarios

US$ million / year	GM rice	GM wheat	GM maize, soybeans, and/or cotton
Bangladesh	452.6 to 452.8	10.4 to 10.6	0.9 to 1.0
India	3241.4 to 3258.8	942.6 to 945.2	824.1 to 825.6
Indonesia	1102.3 to 1107.3	Does not adopt	113.2 to 114.5
Philippines	637.6 to 638.8	Does not adopt	119.9 to 120.2

Among the crops considered, the results show GM rice is the most advantageous, more so than wheat (adopted only in Bangladesh and India), or the other crops. This is because the production and consumption of rice is of particular importance in the region.

Figure 1 illustrates the results by presenting the derived welfare gains arising from the adoption of GM rice in the four countries and in China, using seven scenarios. Similar patterns are observed across scenarios for other crops.

Figure 1. Welfare effects with partial adoption of GM rice* adoption in four countries plus China ($ million/year)



Source: Gruere, Bouet, and Mevel (2007).
Notes: *GM rice encompasses a combination of traits: drought resistance, salt tolerance, insect resistance, and virus resistance.
**China was added as a leading adopter of Bt rice using assumptions from Huang, J., R. Hu, H. van Meijl, and F. van Tongeren. 2004. Biotechnology boosts to crop productivity in China: Trade and welfare Implications. *Journal of Development Economics* 75: 27–54.

For each crop examined, the results show that the benefits of adopting GM varieties do not vary significantly across the seven scenarios for any of the adopting countries. Several factors explain this seemingly unexpected outcome. First, these results imply that the gains associated with the adoption of GM food largely exceed any type of potential trade losses that exporting countries like India or China may incur with trade bans or trade filters. In these populous Asian countries, exports only represent a small fraction of production. Thus, the productivity gains experienced by a large population of farmers and an even greater population of consumers will largely exceed any potential trade loss. Moreover, exports from these countries are not all going toward sensitive countries. For instance, India exports a significant quantity of rice, but not all goes to Europe or other GM-sensitive nations. Second, in net importing countries like Bangladesh, the Philippines, and Indonesia, trade regulations do not make much difference; adopting GM crops allows these countries to largely reduce their imports and become more self sufficient. The overall increase of production on the world market also contributes to a reduction of food prices to the benefit of all consumers.

Furthermore, our results show that the segregation of non-GM crops can help reduce any potential trade loss for GM adopters, like India, that want to keep export opportunities in sensitive countries, even with a 5-percent segregation cost. This means that if there is real commercial risk involved with the adoption of a GM crop, exporting countries could consider the possibility of non-GM segregation for exports.

Finally, the opportunity cost of segregation, which can be defined as the foregone benefits of a country without segregation, is much larger for sensitive importing countries than for countries adopting new GM crops. In other words, avoiding segregation would be more costly for importing-sensitive countries, like European nations, than for adopting countries. This suggests that sensitive importers will have the incentive to invest in separate non-GM marketing channels, if exporting countries like India decide to adopt GM food crops.

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